AgMag
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# CELEBRATING OUR NATURAL RESOURCES

Minnesota, "The Land of 10,000 Lakes," is really the land of 20,000 lakes, ponds and marshes of five acres or more. Forests cover one-third of our state. Our rivers end to end could reach completely around the world. Our cropland would cover all of Rhode Island, Massachusetts, Connecticut and Vermont. Fresh air, rich soil, lots of water, good climate, crops, livestock—our state has them all.

Minnesota's natural resources are our treasures to protect. Our agricultural industries depend on these natural resources. We, the people, depend on agriculture. That's why our farmers and others must act as stewards of the land, or Earth Keepers, protecting these important resources.

When we protect our soil now, it can grow good food, fiber and fuel (energy) for the future. When we clean up our air, we make life healthier for people, plants and animals. When we prevent water pollution, we help keep water safe for cooking, swimming, drinking and aquatic life. Nearly three-fourths of the land in Minnesota is owned by farmers and other private landowners. Why is it important that all landowners and users be good Earth Keepers?

How does each of these photos show a connection to natural resources?

# CELEBRATING OUR NATURAL RESOURCES

What natural resources are these kids enjoying? Besides humans, what or who else benefits from healthy soil, air and water?

## CARE FOR THE SOIL

**Q What four-letter word does all these things?**

- holds roots in the ground so plants don't fall over
- holds water so roots can absorb moisture
- holds minerals and nutrients that plants use for food
- is home to earthworms and other living things helpful to plants

***Without it, life on Earth would come to a dead stop!***

What is it? _____ _____ _____ _____

The soil beneath our feet is as important as the air we breathe and the water we drink. Farmland and forested land represent two-thirds of our state's landscape. Whose responsibility is it to care for the soil? Farmers have a big role to play. But each of us must also help. Here are some soil care tips:

1. Plant grass or flowers in bare soil so it won't wash or blow away.
2. Stay on sidewalks and trails. What happens when people don't? Do you see any places where sidewalks should be built to protect the soil?
3. Do your part to help protect the soil of football and soccer fields, parks and other public places.

For more on soils see: www.nrcs.usda.gov/feature/education

## OUR ACTIONS MATTER!

How do the things we buy affect the water, air and soil we depend on? Visit this website and find out how our interaction with these resources affects Earth now and for years to come.

ON THE WEB

www.pbs.org/pov/borders/2004/index_flash.html

## WHERE'S YOUR BASIN?


You may not know it, but you live in a basin! A **drainage basin** is the area of land drained by a river or lake and its tributaries. Minnesota has 10 major drainage basins. Each basin is made up of smaller units called **watersheds**—areas of land from which rain and melted snow trickle down to the lowest point … a stream, river or lake. Some water flows over the top of the land; other water flows underground.

- In which drainage basin do you live? _____
- In which rivers, lakes and ocean does the water from your basin end up?
- Explain: *"We borrow water! We get it from someplace, we use it, then send it somewhere else."*

ON THE WEB

For more on basins go to:
www.pca.state.mn.us/water/basins/index.html

We borrow water! We get it from someplace, we use it, then send it somewhere else.

# CARE FOR THE AIR

**Q Take a deep breath. Can you tell the difference between fresh air and polluted air?**

Because air travels, polluted air can blow in from near and far. Lucky for us, many people are working to clean up the air. Car makers build engines that pollute less. Laws regulate industrial waste disposal. Many people—including farmers—are making electricity from cleaner, renewable energy sources. They are using solar power, wind and field crops to run our cars, homes and factories. It all adds up to cleaner air!

## THANKS PLANTS!

Green plants help to clean air by soaking up carbon dioxide, trapping fine dust and releasing oxygen during **photosynthesis.** Those green plants include grasses on prairies, algae in oceans, crops in fields and trees in forests. About one-third of the oxygen released comes from grasses and other non-woody plants. One-third comes from ocean plants and one-third from forests. Take a breath . . . and thank the plants!

*Make up a rhyme that uses the words CARE and AIR.*


# CARE FOR THE WATER

**Q How do you like taking a shower in the same water molecules the dinosaurs waded in?**

It's true! The water we use today is the same water that has been recycled for millions of years since the earth was formed. We will never have any MORE water. That's why we need to keep our water clean.

If all the world's water could fit into a gallon jug, including salty oceans and frozen glaciers, only a single drop would be fresh and usable for human needs. The amount of fresh water isn't all we care about. We want the water we drink and use to taste good, smell good and look good. We want it to be safe for all human uses and for **aquatic** creatures, too.

### Did you know?

- The Earth recycles one trillion tons of water every day. A gallon of water weighs 8 pounds. How many gallons are in just one ton (2,000 lbs)?
- The federal Clean Water Act requires states to set water quality standards. These rules protect the nation's waters. They say how much pollution can be in lakes, rivers, streams or groundwater while still being safe for drinking, fishing, swimming, irrigation or industry.

## What do you know about water?

**1.** About two-thirds of the human body is water. People can live without any food for several weeks, but many would survive ___ without water.

**a.** 1 month **b.** 2 weeks **c.** less than a week

**2.** More than 40 percent of the fresh water in the United States (and 10 percent of the world's) is in this lake.

**a.** Long Lake **b.** Lake Superior **c.** Lake Wobegon

**3.** In a lifetime, you will drink enough water to fill more than ___ liter bottles.

**a.** 40,000 **b.** 100 **c.** 500,000

## The Water Cycle

If you sprinkle your lawn, garden or field, where do the water droplets go?

### Show the Flow!

In how many directions does the water in Minnesota's drainage basins flow? Discover the answer with the "Minnesota Drainage Basins" handout in the Teacher Guide.

Don't miss this COOL watercycle website
www.epa.gov/safewater/kids/flash/flash_watercycle.html

## Water Watch

Even in water-rich Minnesota, clean water is a great concern. Five million Minnesotans use and depend on our waters. Water and pollution experts manage our basins and waterways. They study where pollution is coming from and work to solve the problems. For example, they learned that when ocean-going freighters scoop up water for **ballast** in foreign ports and dump it in the Great Lakes, **alien invaders** come, too. New Zealand mudsnails, zebra mussels from the Caspian Sea and Eurasian ruffes all have taken up residence in Lake Superior. What has that meant for native species?

Keeping water clean and usable is a big job. Farmers, industries, homeowners and all of us must work together to keep pollutants out of our waters.

What good times have you enjoyed in our state's sun-sparkled waters? Write, draw, sing or tell about some.

# Home Grown Energy

Every day, Americans need energy (fuel) for heating homes and businesses, cooking food, running industry, powering cars, planes, trains and much more. Much of this energy comes from natural resources. It comes from the sun – the primary source of the earth's energy. It comes from fossil fuels such as coal, natural gas and oil (petroleum). Fossil fuels start out as decayed plants and animals that turn to crude oil deep in the earth.

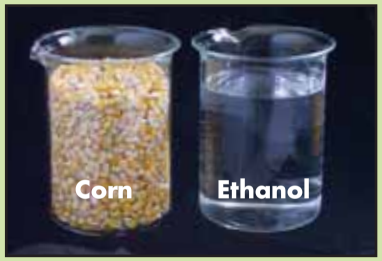
The sun is an everlasting source of energy, but what happens when supplies of coal, natural gas and oil are used up? Because it takes millions of years for them to form again, to us they are not renewable. They are gone for good. Many geologists predict the world will begin to run short of oil in this century. We need to find renewable ways to create energy. Agriculture and science are teaming up to do just that.

## Energy From Plants

### Corn Power

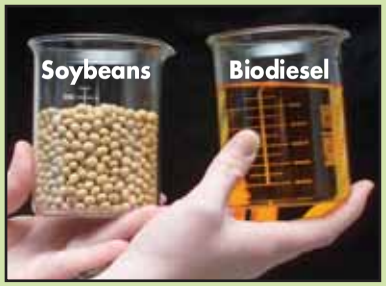
Wouldn't it be great if we had a fuel that causes less air pollution than gasoline, is easy to make here in Minnesota and is renewable? The good news is we do have such a fuel! Ten percent of the gasoline you pump into your car is ethanol, made from corn. When we need more ethanol, we can grow more corn. Ethanol production helps Minnesota farmers, businesses and communities. It can:

- Replace 10% of imported crude oil used to make gasoline. That saves both oil and money.
- Help cut air pollution. Ethanol burns cleaner than gasoline.
- Provide jobs at ethanol plants.
- Build new markets for the state's largest crop – corn. Corn growers earn money selling their corn to the ethanol processing plant. Many ethanol plants are owned by the growers themselves in businesses called **cooperatives** (co-ops). That means growers also share in the income when the ethanol is sold.




Photos Courtesy University of Minnesota Agricultural Experiment Station

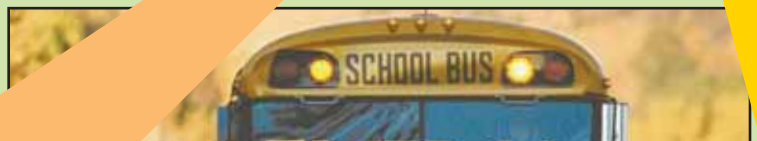
### Beans in your Bus!




Photos Courtesy University of Minnesota Agricultural Experiment Station

Is there a long line of buses waiting to take students home when your school gets out? If so, you may notice the smell of diesel exhaust in the air. Many big, powerful engines burn diesel fuel. Breathing diesel smoke is not good for our lungs and hearts, or for our environment. Agriculture is helping clean the air by producing **biodiesel** fuel for engines in buses, trucks, tractors and some cars.

Biodiesel is an environmentally friendly fuel, burning much cleaner than fuels made from oil. In Minnesota, most biodiesel fuel is made from soybeans, which are high in oil. Like ethanol, it is renewable because it comes from crops that can be grown every year.



About 18% of Minnesota's corn crop is used for ethanol. If ethanol causes high demand for corn, what happens to the price of corn? Cattle, hog and poultry farmers and makers of many different foods also need corn. What do higher corn prices mean for them and for us?


Photo Courtesy American Lung Association of Minnesota

Watch for E85 at some gas staions. It's an 85% ethanol fuel from corn.

Photo Courtesy Minnesota Soybean Council

Think about all the things you do that depend on energy. What would you do without it?

**Did you know?**

Ethanol can be made from other high-starch crops besides corn. Soybeans, sugar cane, sugar beets, potatoes and even cheese whey are some of the others. In Brazil, many cars run on a mix of nearly 100% ethanol made from sugar cane.

## Biomass

World demand for both food and fuel is expected to double in the next 50 years. We need to take the burden off corn as our main source of ethanol. Soon we may be using fuel from the fiber of sticks and trees, prairie grass, wheat straw, cornstalks, sugar cane, paper pulp, rice hulls and even garbage!

Photo Courtesy Agricultural Utilization Research Institute

## Harvesting the Wind

Photo Courtesy Agricultural Utilization Research Institute

If you live in southern Minnesota or have visited there, it's a sure bet you've noticed the wind. It seems to blow all the time! Scientists and farmers took notice, and some farmers across southern Minnesota added to what they produce. Many fields with crops now also hold towering wind turbines, gently turning in the wind. The wind power is used to generate electricity. Minnesota's wind turbines now produce enough electricity for over 270,000 average households. How does wind-generated energy save water? How does it reduce air pollution?

5 ON THE WEB

Make your own windmills and more. Check out: **www.kidwind.org**

## POOP Power



Photos Courtesy University of Minnesota Agricultural Experiment Station

The farm's poop power makes enough electricity to run the whole farm with plenty left to sell to others.

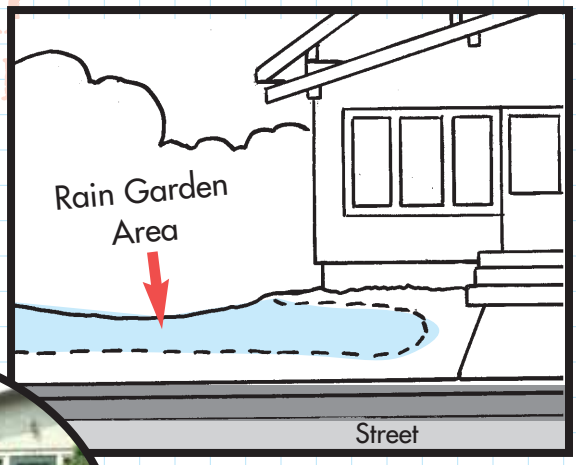
Habenschield Farms near Princeton was the first Minnesota farm to use cow manure (poop) to produce electricity. Over 800 cows on the farm produce about 20,000 gallons of manure every day. The manure is scraped from the barn, together with recycled newspapers that are used for bedding for the cows. It's mixed until smooth, and then pumped into a huge covered digestion tank, where it heats up and gives off **methane** gas. The gas is burned by an engine that drives a generator that creates electricity. The manure, now a lot less smelly, empties into a storage lagoon. Later, it is spread on cropland as **fertilizer**. Why do farmers use fertilizer?

AgMag

PROTECTING NATURAL RESOURCES

# WHEREVER YOU LIVE

You've been learning a lot about how agriculture is protecting our natural resources. You don't need to be a farmer or live in the country to do your part. Plenty of people in cities and towns across America are working hard to conserve natural resources and energy. Here are some things we all can do. Read on…




Rain gardens are gardens designed with a dip in the center to collect rain and snow melt. When planted next to hard surfaces such as sidewalks and parking lots, rain gardens collect runoff water. This water is filtered as it seeps slowly into the ground. Rain gardens help keep runoff out of storm sewers, or from running directly into our lakes and streams.

## Make Rain Gardens

Before all the roofs, streets, alleys, parking lots, driveways and sidewalks of urban areas appeared, rain and melted snow seeped slowly back into the earth. But water flows quickly across hard human-built surfaces, picking up urban pesticides, lawn fertilizers, and gas and oil residue. This polluted run-off dumps into storm sewers. It moves through the sewer system into local lakes, streams and wetlands. Some city folks are helping slow pollution with rain gardens.

*Photo Courtesy University of Minnesota Agricultural Experiment Station*

## Use Native Plants in Landscaping

Would your family like to save time, energy and natural resources in your own back yard? Ask for **native plants** and seeds at plant nurseries and garden stores. Native plants are those that thrived in our ecosystem long before people came along. Because the setting is natural for them, they are hardy through a range of weather and soil conditions with little help from us. That means less tilling, mowing, watering, fertilizing or fuss. No matter where you live, you can have native species that will be right at home in your yard.

**Two Native Plants**

Brown-eyed Susan

Cardinal Flower

*Photos Courtesy Peter Dziuk*

# BUY LOCALLY

Strawberries, squash, dairy products, meat, cereal, building materials. Our families use them all, but where do these items come from? Are they grown near you? Do they come from another state or country? How does that make a difference in the time, energy and resources used?

**Think & Discuss**

### Check the Greener Choice!

Buy strawberries from
- ☐ a local farmers' market.
- ☐ a store that got them "fresh from California."

Buy grocery store milk that came from a
- ☐ nearby dairy.
- ☐ another state.

Drink water from
- ☐ recyclable bottles.
- ☐ the tap (faucet).

MINNESOTA GROWN™

During the winter months, we depend on imports from other states and countries to bring us fresh food, flowers and more. But even in winter, we have some choices. Next time you're in the grocery store, check the food labels. See where some of your favorite foods come from. Are your frozen peas from Le Sueur, MN or from California? Is your turkey from Willmar or from North Carolina?

Stores work hard to bring us variety because we want and expect it. Still, how is food that travels shorter distances the greener choice?

IMPORTS

# TRANSPORTATION CONNECTS AGRICULTURE, PLACES AND PEOPLE

Early Minnesotans were used to horses, barges and trains. Imagine how things changed in the early1900s when cars came along! People could travel faster, farther and with more freedom than ever before — but they needed good roads to do it.

From the early days of statehood in 1858, the Minnesota Legislature was involved in road building. The State is still involved. The Minnesota Department of Transportation (MnDOT) builds roads and bridges. It oversees airfreight and passenger carriers, ports and waterways, railroads and public transportation (light rail, buses, bicycling and other ways we travel).

## MODERN MOVERS

Modern railways, highways, air routes and two main water routes — the Mississippi River and the Great Lakes — carry millions of tons of Minnesota ag products to consumers around the world today.

**HIGHWAYS –** Have you seen trucks heaped high with corn or peas rumbling down Minnesota's rural highways at harvest time? Trucks take farm products from fields to elevators, processing plants and harbors. Our excellent network of roads has helped many Minnesota towns become major centers for moving farm products to market. Good roads have affected where towns flourish and grow. How do the roads where you live make a difference in your town?

**RAILROADS –** Have you ever counted a train with more than 100 rail cars? They're common here. Railroads can link elevators and lake or river ports, or take products all the way from elevators to consumers. Minnesota soybeans bound for Mexico start at elevators and ride the rails the whole way through.

**AIRPLANES –** Air travel is the most expensive way to move products, but it's also the fastest. Speed is important to keep things fresh when they come long distances. A flower stall at the Mpls. St. Paul International Airport shows the clock time from fields in Equador to our airport. It's less than 24 hours! Bulbs come to us from the Netherlands; seafood from Seattle. Avocados, bananas, melons and cucumbers come from the Dominican Republic and mushrooms from France and South Africa. Pineapples come from Mexico and Hawaii; seeds for experimental plants come from around the world. Fare from the air brings variety to our lives!

**RIVERS AND PORTS –** The Minnesota and Mississippi Rivers carry goods and products between the Midwest and the world. Dry beans from Renville County and wheat from the Red River Valley are just two crops that travel by water to ports around the world.

The Great Lakes and the St. Lawrence River are waterways that link our landlocked state to the Atlantic Ocean nearly 2,700 miles away. Grain, iron ore and coal make up 91 percent of cargo leaving Duluth Seaway Port for faraway places. Field crops and forest products also move through the port each year.

*Photos from Top to Bottom Courtesy: Truck-Minnesota Trucking Association. All others University of Minnesota Agricultural Experiment Station*

**1903**

Kitty Hawk first flight

**1920**

Early trucks appear

**Late 1900's and Today**

Land, air and water transportation are everywhere

# GRAB BAG

## On Tap

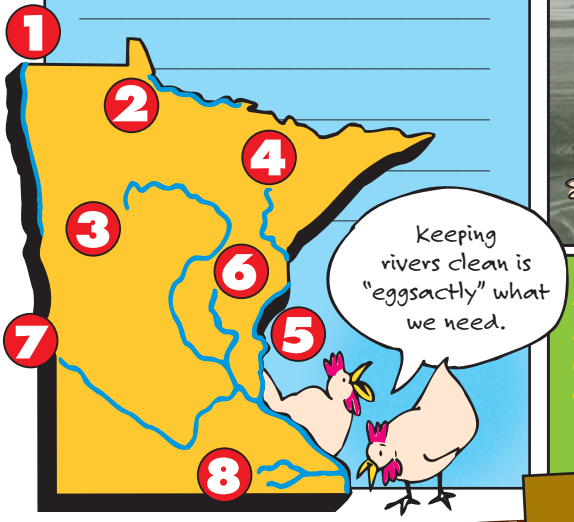
Americans spend **$7.7 Billion Dollars** a year on bottled water. The energy we waste using water that's bottled and shipped would be enough to power 190,000 homes. But refilling your water bottle from the tap requires no extra energy and no waste of resources.

## River Reach

**Label these 8 rivers**

- ☐ Minnesota
- ☐ Mississippi
- ☐ St. Croix
- ☐ Red
- ☐ Rainy
- ☐ Rum
- ☐ St. Louis
- ☐ Root

How can ***you*** help protect our rivers?




## Surfing the net WWW

What's your ecological footprint? How does it compare to that of kids in other countries? Find out with this online quiz. Will you change some of your habits?

www.earthday.net/footprint/index.asp

## Home Connection

Make a list of all the ways your family uses water in a week. Then guess how much water it is. Next, find your family's water meter. Take a notepad and jot down the date, time, and the numbers on the meter. (A parent can help you read the dials.

Is it gallons, **cubic meters**, or **cubic feet**?) Read the meter again after one week and see how your prediction checked out.

## Clean & Green


**A geological formation in southwest Minnesota known as the Buffalo Ridge is one of the highest concentrations of wind turbines in the nation.**

Photo Courtesy Dan Juhl, Woodstock, MN

## Mystery Photo

What does this image have to do with a bus ride to school? To find out visit **www.mda.state.mn.us/maitc**

## Name this April Day

_____ Day

Date _____

**Country Corn Q.** If a rooster laid an egg on a slanted roof, which way would it roll?

**A.** No way. Roosters don't lay eggs.

## AgMag NEWS

Minnesota **lawmakers** are debating a new law in 2007. A proposal calls for 25 percent (one-fourth) of all Minnesota electricity to come from renewable sources by the year 2025. Such a law will make Minnesota a **leader in clean energy.**

Watch the news to see what lawmakers do.

## FOR SEVEN GENERATIONS...

When making an important decision, an old Native American question was:

**HOW WILL THIS AFFECT THE PEOPLE SEVEN GENERATIONS FROM NOW?**

What do you think this meant? _____

How would thinking like this make a difference in what we do to the environment today?

_____

_____



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